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MEMORANDUM

To: Stephanie Vaughn, USEPA

From: Shannon Katka, Jennifer Parker, Lisa Saban, Windward Environmental LLC; Betsy Ruffle, AECOM, Robert Law, de maximis, inc.

Subject: Sample Analysis Plan for Background Fish Tissue

Date: March 14, 2013

This memorandum presents the proposed background tissue analysis and compositing plan applicable to the target and non-target fish species caught during the Fall 2012 LPRSA background tissue sampling event. Four target species (and two surrogate species) were identified in the *Fish and Decapod Crustacean Tissue Collection for Chemical Analysis and Fish Community Survey Tissue QAPP Addendum No. 5* (QAPP Addendum No. 5, Windward 2012): American eel, channel catfish (or brown bullhead as a surrogate species), common carp, and largemouth bass (or smallmouth bass as a surrogate species). A total of 80 analytical samples (20 analytical samples [10 fillet and 10 carcass samples] of each target species) were targeted in the QAPP Addendum No. 5. As noted in the QAPP Addendum No. 5, the actual number of samples for chemical analysis was dependent on the outcome of the sampling effort. The attached Tables 1 through 3 provide the details on the proposed analysis and compositing plan. Table 1 presents all of the upstream fish samples collected during the Fall 2012 sampling event. Table 2 presents the composite and individual samples proposed for analysis for each species. A total of 103 analytical samples is proposed. Table 3 provides a comparison of the analytical fish tissue samples that were collected from the LPRSA to the upstream analytical fish tissue samples that are proposed herein.

As summarized below, the sample analysis plan for the four target species/surrogates results in 72 analytical samples:

- **American eel** – A total of 20 analytical samples were targeted per the QAPP Addendum No. 5 (Windward 2012). Analysis of a total of 26 location-specific[1] samples (10 fillet, 10 carcass, 6 whole body) is proposed to include eel that are similar in size to those collected and analyzed from the Lower Passaic River

[1] Note one proposed background American eel composite is across two locations that are approximately 0.2 miles in distance from each other.

Study Area (LPRSA) (Table 3). To be comparable with the LPRSA samples, individual and composite fillet and carcass samples, and individual whole body samples will be analyzed. These will include 5 individual fillet, 5 individual carcass, 5 composite fillet, 5 composite carcass, and 6 individual whole body samples. Each composite sample will contain between 2 and 8 eels per sample, depending upon the sizes of the fish to be composited. Ranges of sample lengths are provided in Table 2.

- **Channel catfish/Brown bullhead (surrogate)** – A total of 20 analytical samples were targeted per the QAPP Addendum No. 5 (Windward 2012). Analysis of a total of 8 location-specific channel catfish samples (4 fillet and 4 carcass) and 6 location-specific brown bullhead samples (6 fillet) is proposed to include fish that are relatively similar in size to channel catfish collected and analyzed from the LPRSA (Table 3). In addition, analysis of 6 location-specific brown bullhead samples (6 whole body) is proposed to include fish that are relatively similar in size to brown bullhead collected and analyzed from the LPRSA (Table 3).To be comparable to the LPRSA samples, only individual fish (no composite samples) will be analyzed.
- **Common carp** – A total of 20 analytical samples were targeted per the QAPP Addendum No. 5 (Windward 2012). Analysis of a total of 20 location-specific samples (10 fillet, 5 carcass, and 5 whole body) is proposed to include carp that are similar in size to carp collected and analyzed from the LPRSA (Table 3). To be comparable to the LPRSA samples, only individual fish (no composite samples) will be analyzed.
- **Largemouth bass/Smallmouth bass (surrogate)** – A total of 20 analytical samples were targeted per the QAPP Addendum No. 5 (Windward 2012). Analysis of a total of 6 location-specific samples (3 fillet and 3 carcass) is proposed to include smallmouth bass that are similar in size to smallmouth bass and largemouth bass collected and analyzed from the LPRSA (Table 3). No largemouth bass are proposed for analysis.[2] Composite samples will be analyzed and each composite sample will include 2 to 3 fish, depending upon the sizes of the fish to be composited. Ranges of sample lengths are provided in Table 2.

While the QAPP Addendum No. 5 (Windward 2012) did not identify non-target species for chemical analysis, at the request of USEPA, all fish (including both target and non-target species) caught during the field sampling effort were retained. Several of these species were included in the sample analysis plan for the LPRSA, including several small forage fish, white perch, white sucker, and northern pike. In order to provide background tissue chemistry data for comparison with the LPRSA data set, a subset of the non-target fish are also proposed for analysis:

- **Small forage fish** – Analysis of a total of 3 location-specific samples (3 whole body composite samples) is proposed to include the following fish species (one composite samples per species): banded killifish, pumpkinseed, and silver shiner. These species were also collected and analyzed from the LPRSA (18

[2] Only one small largemouth bass (i.e., measuring 80 mm in length and 6.5 g in weight) was caught during the 2012 background tissue sampling event.

mummichog, 1 pumpkinseed, and 1 silver shiner whole body composite samples were analyzed from the LPRSA [Table 3]).

- **White perch** – Analysis of a total of 16 location-specific composite samples (8 fillet and 8 carcass) is proposed to include white perch that are similar in size to a portion of the white perch[3] collected and analyzed from the LPRSA (Table 3). Because white perch are one of the target species for the LPRSA (a total of 39 samples were analyzed from the LPRSA: 19 fillet, 1 carcass, and 19 whole body samples [Table 3]), a background chemistry data set will be useful for the risk assessments. Based on an evaluation of the LPRSA white perch data, it is anticipated that a sample size of 8 fillet and 8 carcass background tissue samples should be sufficient for comparison purposes.[4]
- **Northern pike** – Analysis of a total of 2 composite samples (1 fillet and 1 carcass) is proposed to include northern pike that are similar in size to the single northern pike collected and analyzed from the LPRSA (1 fillet and 1 carcass sample were analyzed from the LPRSA [Table 3]). USEPA has indicated that the northern pike data are for consideration in the uncertainty section of the risk assessments.
- **White sucker** – Analysis of a total of 10 individual samples (5 fillet and 5 carcass) is proposed to include white sucker that are similar in size to the five white suckers collected and analyzed from the LPRSA (5 fillet and 5 carcass samples were analyzed from the LPRSA [Table 3]). USEPA has indicated that the white sucker data are for consideration in the uncertainty section of the risk assessments.

With the addition of the 31 samples of non-target species, a total of 103 upstream tissue analytical samples are proposed.

REFERENCES

Windward. 2009. Lower Passaic River Restoration Project. Lower Passaic River Study Area RI/FS. Quality Assurance Project Plan: Fish and decapod crustacean tissue collection for chemical analysis and fish community survey. Final. Prepared for Cooperating Parties Group, Newark, NJ. Windward Environmental LLC, Seattle, WA.

Windward. 2012. Lower Passaic River Restoration Project. Lower Passaic River Study Area RI/FS. Background tissue addendum to the Quality Assurance Project Plan: Fish and decapod crustacean tissue collection for chemical analysis and fish community survey. Addendum No. 5. Final. Prepared for Cooperating Parties Group, Newark, NJ. October 10, 2012. Windward Environmental LLC, Seattle,

[3] White perch collected from background proposed for analysis ranged from 180 to 284 mm in length; white perch collected from the LPRSA that were analyzed ranged from 118 to 321 mm in length.

[4] An analysis of the white perch fillet data for TCDD-TEQ and total PCBs found the data to be normally distributed, with coefficient of variation (CV) values of 0.58 and 0.57, respectively. Assuming a similar variance in the background samples and precision of 100% for a skewed population of tissue concentrations, 5 to 11 samples are estimated to be needed (Attachment Q of the *Quality Assurance Project Plan: Fish and Decapod Crustacean Tissue Collection for Chemical Analysis and Fish Community Survey* [Fish/Decapod Tissue QAPP] (Windward 2009)).

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